CLAIMS

We claim:

1. A fuel cell system, comprising:

Hydrogen fuel;

A CO removal system based upon non-Faradaic electrochemical modification of catalyst activity (electrochemical promotion); and

A fuel cell stack.

2. The fuel cell system of claim 1 wherein the CO removal system comprises:

A working electrode;

An electrolyte;

A counter electrode; and

A power source,

Wherein rapid dynamic response is achieved over a wide temperature range.

3. The fuel cell system of claim 2 wherein the working electrode is a catalyst.

4. The fuel cell system of claim 2 wherein the working electrode is a catalyst deposited on the working electrode.

5. The fuel cell system of claim 2 wherein the power source is a voltage.

6. The fuel cell system of claim 5 wherein the voltage is AC.

7. The fuel cell system of claim 5 wherein the voltage is DC.

8. The fuel cell system of claim 2 wherein the power source is a current.

9. The fuel cell system of claim 8 wherein the current is AC.

10. The fuel cell system of claim 8 wherein the current is DC.

11. The CO removal system of claims 3 or 4 wherein a current can be applied to pass through the catalyst.

12. The CO removal system of claims 3 or 4 wherein a current can be applied between the working electrode and counter electrode.

13. The fuel cell system of claim 2 wherein the wide temperature range is between 0 and 800 degrees Celsius.

14. The fuel cell system of claim 2 wherein the working electrode is a Pt catalyst.

15. The fuel cell system of claim 2 wherein the working electrode is an Rh catalyst.

16. The fuel cell system of claim 2 wherein the working electrode is an Au catalyst.

17. The fuel cell system of claim 2 wherein the working electrode is a Cu/ZnO catalyst.

18. The fuel cell system of claim 2 wherein the working electrode is a Cu/CuO catalyst.

19. The fuel cell system of claim 2 wherein the working electrode is an ABO3 (perovskite) catalyst.

20. The fuel cell system of claim 2 wherein the working electrode is a zeolite catalyst.

21. The fuel cell system of claim 2 wherein the working electrode is a Pd catalyst.

22. The fuel cell system of claim 2 wherein the power source is a battery.

23. The fuel cell system of claim 2 wherein the power source is a potentiostat.

24. The fuel cell system of claim 2 wherein the power source is a galvanostat.